

Amendments to the Claims: This listing of claims will replace all prior versions, and listings, of claims in the application

Listing of Claims:

1. (Currently Amended) A method for identifying a specific image ~~and/or~~ a specific audiovisual sequence within a flow of images or audiovisual sequences, and in particular with the prospect of being able to identify a proprietary image within the flow and/or of being able to identify a plurality of proprietary audiovisual sequences within the flow; the method comprising the steps of: a step

receiving a stream of digitized image signals representative of the images, and executing an indexing process by a processor, of calculating, for the processor executing the indexing process to calculate for each said digitized image signal, an index appearing in the form of a ordered and finite set of values, and in particular in the form of a characteristic vector; thereby digitally encoding the content of the image; the index calculation process being hereinafter called the indexing process;

~~the method comprising at least one of:~~

calculating a reference index, using the indexing process for the specific image, or extracting reference indexes from the specific audiovisual sequence, so as to form a reference set of said reference indexes; ~~in, such a way that said reference indexes that are characteristic of the specific image and/or of the specific audiovisual sequence are thus obtained;~~

~~the method additionally comprising the step of receiving the index signal and calculating an index a current index for the current images-image of the flow, using the indexing process for the current images-image of the flow; the index being hereinafter called the current index;~~

~~the method additionally comprising the step of comparing the reference indexes with the current index of the current image of the flow; flow,~~

~~wherein, wherein the indexes appear in the form of ordered and finite sets of values identified, in the reference index and the current index, by a system of coordinates; the method additionally comprises the following steps:~~

defining, for a given coordinate of the system of coordinates, a pair of values, of which:

a first value of the pair of values is the value appearing in the reference index associated with the given coordinate, and ~~of which;~~

a second value of the pair of values is the value appearing in the current index associated with the given coordinate,

calculating a bidimensional histogram of the pairs of values obtained for all the coordinates of the system of coordinates of the reference index and of the current index; ~~index;~~

calculating a discrete entropy of the bidimensional histogram; ~~hereinafter called the entropy of the bidimensional histogram;~~

calculating a discrete reference marginal entropy of the distribution of the values of the reference index or a discrete current marginal entropy of the current index; ~~the discrete entropy of the distribution of values or the discrete entropy of the current index being hereinafter called the reference marginal entropy or the current marginal entropy respectively;~~

wherein: ~~the comparison time is thus optimized;~~ and the reference marginal entropy value or the current marginal entropy value is configured to be added to the reference index or the current index, respectively; and

calculating a comparison distance between the reference index and the current index, using the reference marginal entropy, the current marginal entropy and the entropy of the bidimensional histogram; histogram,

~~whereby~~ wherein a specific image is detected within the flow, using the comparison distance, ~~with precision and speed, while being robust during major photometric alterations.~~

2. (Currently Amended) A method in accordance with claim 1 wherein the calculation of at least one of the reference index or the current index additionally comprises the ~~step of~~ steps of:

resampling the image as an imagea normalized image with fixed dimensions in advance;
~~the resampled image being hereinafter called the normalized image;~~

~~the method additionally comprising, if the image is a color image comprising levels of colors, a step of converting the levels of colors of the image to be resampled to levels of grayscale if the image is a color image;~~

wherein the normalized image₁ is represented by a matrix of said pixel values after discrete quantization of the pixel values; and

~~the method additionally comprising:~~

arranging the quantized pixel values according to a predetermined running order of the positions in the matrix, ~~so as to obtain the~~ reference index or current index.

3. (Currently Amended) A method in accordance with one of the claims 1 ~~and 2or 2;~~ wherein the step of calculating the comparison distance between the reference index and the current index is performed by forming a ratio between a sum of the reference marginal entropy and of the current marginal entropy reduced by the entropy of the bidimensional histogram as the numerator and a sum of the reference marginal entropy and the current marginal entropy as the denominator.

4. (Currently Amended) A method in accordance with claim 3 wherein, ~~to extract the reference indexes of the specific audiovisual sequence from the specific audiovisual sequence,~~ the method additionally comprises the following steps of:

initializing a reference set containing the reference indexes of specific images with ~~the a~~ first reference index of a first specific image of the specific audiovisual sequence; ~~the reference index of the first specific image of the specific audiovisual sequence constituting a first reference index of the reference set;~~

~~the method additionally comprising:~~

(a) calculating, for each said specific image of the specific audiovisual sequence, a temporary current index and calculating a comparison distance between the temporary current index and a last reference index added to the reference ~~set~~set;

(b) comparing the comparison distance between the temporary current index and the last reference index added to the reference set to a predetermined threshold SE;

(c) adding the temporary current index to the reference set, if the comparison distance exceeds the predetermined threshold ~~SE~~SE, the temporary current index ~~becoming~~being the last reference index of the reference set;

~~the method additionally comprising the step of~~ repeating the steps (a) through (c) up to the end of the specific audiovisual sequence.

5. (Currently Amended) A method in accordance with claims 1 or 2 ~~wherein the step of comparing the reference indexes with the current index of the current image of the flow further comprises~~additionally comprising the ~~step~~steps of:

comparing the comparison distance to a further predetermined threshold ~~SF~~SF,

wherein in the case of said flow of said ~~images~~images, the specific image is detected ~~provided that if~~ the comparison distance between the reference index of the specific image and the current index is less than the further predetermined threshold SF.

6. (Currently Amended) A method in accordance with claim 4, ~~the method being designed for detecting a specific audiovisual sequence within any said flow of said audiovisual sequences,~~ the method additionally comprising the steps of:

(a) initializing a variable T at a value of -1, initializing a variable D at a value of 0,

(b) calculating, for each said reference index of the reference set, the comparison distance between the reference index of the reference set and the current index,

wherein if the comparison distance is less than a predetermined threshold SD, a detection condition is met and the variable D is increased by one, and, the condition being ~~hereinafter called the condition for detecting said reference indexes;~~

~~the method being such that the~~ wherein a moment of a first detection is when the first said reference index of the reference set of the specific audiovisual sequence meets the detection condition ~~is hereinafter called the moment of the first detection; and~~

~~the method additionally comprises the following steps:~~

(c) assigning a time elapsed since the moment of the first detection to the variable T ~~the time elapsed since the moment of the first detection~~ if the variable D is different from zero,

(d) repeating step (b) until the variable D reaches the predetermined threshold SD, SD; ~~or of~~ repeating step (a) if the variable T exceeds a predetermined threshold ST,

(e) detecting the specific audiovisual sequence if the variable D reaches the predetermined threshold SD.

7. (Currently Amended) A system for identifying a specific image ~~and/or~~ a specific audiovisual sequence within a flow of digitized images or audiovisual sequences, the system comprising ~~at least one of:~~

first calculation means for calculating a reference index for the specific digitized image, using an indexing process, or first computer analysis means for extracting reference indexes from the specific audiovisual sequence, so as to form a reference set of reference indexes;

~~the system additionally comprising:~~

reception means for receiving the flow of said digitized images or said audiovisual sequences comprising at least one specific digitized image or at least one specific audiovisual ~~sequence, sequence;~~

~~computer processing means for digitizing the flow of said images or said audiovisual sequences;~~

wherein the reference index is ~~in the form of~~ an ordered and finite set of values, and

~~whereby wherein~~ a reference index characteristic of the at least one specific image or of the specific audiovisual sequence is ~~thus~~ obtained;

~~the system additionally comprising:~~

second calculation means for calculating a current index for current images of the flow, using the indexing process for the current images of the ~~flow; flow~~, the current index appearing in the form of a ordered and finite set of values, encoding the content of the current image;

~~the system additionally comprising:~~

comparison means for comparing the reference index of the specific image with the current index of the current image of the monitored flow;

the first calculation means additionally comprising reference processing means for calculating a discrete reference marginal entropy of the distribution of values of the reference ~~index; index~~, the entropy being hereinafter called the ~~reference marginal entropy~~; wherein the comparison time is ~~thus optimized; optimized~~, and the reference marginal entropy value is configured to be added to the reference ~~index; index~~.

the second calculation means additionally comprising current processing means for calculating a discrete current marginal entropy of the distribution of values of the current ~~index; index~~, the discrete entropy of the distribution of the values of the current index being hereinafter called the ~~current marginal entropy~~; wherein the comparison time is ~~thus optimized; optimized~~ and the current entropy value is configured to be added to the current ~~index; index~~;

~~wherein,~~wherein the reference indexes and the current indexes are in the form of ordered and finite sets of values identified, in the reference index and the current index, by a system of coordinates; and

~~the system additionally comprises third calculation means for:~~

defining, for a given coordinate of the system of coordinates, a pair of values, a first value of the pair being a value appearing in the reference index associated with the given coordinate, and a second value of the pair being a value appearing in the current index associated with the given coordinate,

calculating a bidimensional histogram of the pairs of values obtained for all the coordinates of the system of coordinates of the reference index and the current index,

calculating a discrete entropy of the bidimensional histogram, and hereinafter ~~called the entropy of the bidimensional histogram,~~

calculating a comparison distance between the reference index and the current index, using the reference marginal entropy, the current marginal entropy and the entropy of the bidimensional histogram,

whereby a specific image within the flow is detected ~~with precision and speed, while being robust during major photometric alterations.~~

8. (Currently Amended) A system in accordance with claim 7, wherein the first calculation means ~~for calculating a reference index of a specific image~~further comprises:

sampling means for resampling the specific image as a resampled specific image with fixed ~~dimensions,~~dimensions;

quantization means for discrete quantization of the pixel values of the specific image resampled wherein the resampled specific image is represented by a matrix of pixel values, after discrete quantization; and

sequencing means for arranging the pixel values according to a predetermined running order of positions in the matrix, ~~so as to obtain the reference index; and~~

~~wherein the system additionally comprises, if the specific image is a color image including levels of colors,~~ conversion means for converting the levels of colors of the specific image to be resampled to levels of grayscale, if the specific image is a color image.

9. (Currently Amended) A system in accordance with ~~any of the claims 7 and 8 or 8,~~ wherein the second calculation means ~~for calculating a current index of a current image~~further comprises:

current image sampling means for resampling the current image as a current image with fixed ~~dimensions,~~dimensions;

current image quantization means for discrete quantization of the pixel values of the current image wherein the resampled current image is represented by a matrix of pixel values, after discrete quantization;

current image sequencing means for arranging the pixel values of the current image according to a predetermined running order of positions in the matrix ~~so as to obtain the current index; and~~

~~wherein the system additionally comprises, if the current image is a color image including levels of colors,~~ current image conversion means for converting the levels of colors of the current image to be resampled to levels of grayscale, if the current image is a color image.

10. (Currently Amended) A system in accordance with claims 7 or 8, in which the third calculation means ~~calculate~~calculates the comparison distance between the reference index and the current index, by forming a ratio between a sum of the reference marginal entropy and the current marginal entropy reduced by the entropy of the bidimensional histogram as the numerator and a sum of the reference marginal entropy and the current marginal entropy as the denominator.

11. (Currently Amended) System in accordance with ~~claim 10;~~claim 10, wherein, ~~to extract the reference indexes of said specific audiovisual sequence from the specific audiovisual sequence, made up of said specific images,~~ the system additionally comprises:
fourth

fourth calculation means using-executing a calculation algorithm, the calculation algorithm comprising a step of~~the steps of:~~

initializing a reference set containing the reference indexes of the specific images with the first reference index of the first specific image of the specific audiovisual sequence; ~~the reference index of the first specific image of the specific audiovisual sequence constituting the first reference index of the reference set;~~

~~the calculation algorithm additionally comprising:-~~

(a) calculating, for each said specific image of the specific audiovisual sequence, a temporary current index and calculating a comparison distance between the temporary current index and a last reference index added to the reference set;

(b) comparing the comparison distance between the temporary current index and the last reference index added to the reference set to a predetermined threshold SE;
SE;

(c) adding the temporary current index to the reference set, if the comparison distance exceeds the predetermined threshold ~~SE;~~SE, the temporary current index becoming the last reference index of the reference set ~~{30};~~; and

~~the calculation algorithm additionally comprising the step of repeating the steps (a) through (c) up to the end of the specific audiovisual sequence.~~

12. (Currently Amended) A system in accordance with claim 10,

wherein the third calculation means compares the comparison distance between the reference indexes and the current index of the current image of the flow to a further predetermined threshold SF; and

wherein in the case of said flow of said images, the specific image is detected provided that the comparison distance between the reference index of the specific image and the current index is less than the further predetermined threshold SF.

13. (Currently Amended) A system in accordance with claim 11, the system being designed for detecting a specific audiovisual sequence within said flow of said audiovisual ~~sequences; sequences,~~ the system additionally comprising:

initialization means for ~~loading; loading~~ a value -1 in a first register T, and a value 0 in a second register D;

~~the system additionally comprising~~ fifth calculation means for calculating, for each said reference index of the reference set, a further comparison distance between the reference index of the reference set and the current ~~index; index,~~

wherein, if a condition for detecting said reference indexes is met where the comparison distance is less than a predetermined threshold SD, the value in the second register D is increased by ~~one; one,~~ the condition being hereinafter called the condition for detecting said reference indexes;

wherein a moment of the first detection is when the first reference index of the reference set of the specific audiovisual sequence meets the detection condition ~~is hereinafter called the moment of the first detection;~~

wherein the fifth calculation means ~~being configured to load; loads~~ in the first register T, the time elapsed at the moment of the first detection if the value ~~stored in~~ the second register D is different from ~~zero; zero,~~

wherein the fifth calculation means ~~being configured to repeat repeats~~ the calculation of the comparison distance, until the value stored in the second register D reaches the

predetermined threshold SD, or, for repeating the use of the initialization means, if the value stored in the first register T exceeds a predetermined threshold ST, and

~~whereby~~ wherein the specific audiovisual sequence is detected if the value stored in the second register D reaches the predetermined threshold SD.